Abstracts

Transmission-Line Properties of a Strip Line Between Parallel Planes

H.A. Wheeler. "Transmission-Line Properties of a Strip Line Between Parallel Planes." 1978 Transactions on Microwave Theory and Techniques 26.11 (Nov. 1978 [T-MTT]): 866-876.

The subject is a strip line sandwiched in dielectric between parallel planes (commonfy termed "stripline"). In the manner of the author's earlier papers relating to a different type (1964, 1965, 1977), all the significant properties are formulated in explicit form for practical applications. This may mean synthesis and/or analysis. Each formula is a close approximation for all shape ratios, obtained by a gradual transition between theoretical forms for the extremes of narrow and wide strips. The effect of thickness is formulated to a second-order approximation. Then the result is subjected to numerical differentiation for simple evaluation of the magnetic-loss power factor from the skin depth. The familiar derivation for a thin strip (in terms of elliptic integrals K'/K) is obtained by a simple algorithm of binary stepping with no reliance on tables. This is susceptible of any degree of approximation in closed form and is reversible for synthesis or analysis. It is used to verify a simple empirical formula which is more convenient for differentiation. In the transition region between the extremes of narrow and wide strips, the effect of thickness is computed by conformal mapping and numerical integration (in place of elliptic integrals). From this reference, a simple empirical formula is verified. Graphs are given for practical purposes, showing the wave resistance and magnetic loss for a wide range of shape and dielectric. For numerical reading, the formulas are suited for programming on a small digital calculator.

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